

Exercise session problems

Problem 1.

Solve the following systems of equations:

$$\begin{aligned} \text{a) } 2x + 3y &= 14 \\ 7x - 4y &= 20 \end{aligned}$$

$$\begin{aligned} \text{b) } x^2 + y^2 &= 20 \\ x - y &= 2 \end{aligned}$$

$$\begin{aligned} \text{c) } x - 2y &= 6 \\ xy &= -4 \end{aligned}$$

$$\begin{aligned} \text{d) } x^2 - y^2 &= 8 \\ xy &= 3 \end{aligned}$$

Problem 2.

Solve the equation $ax = b$ when

$$\text{a) } a = 4, b = 12$$

$$\text{b) } a = 4, b = 0$$

$$\text{c) } a = 0, b = 12$$

$$\text{d) } a = b = 0$$

Problem 3.

Solve the following systems of equations:

$$\begin{aligned} \text{a) } x + y + z &= 4 \\ x + 2y + 4z &= 9 \\ x + 3y + 9z &= 16 \end{aligned}$$

$$\begin{aligned} \text{b) } x - y + z &= 3 \\ 2x - 4y + z &= 1 \\ 3x - 5y + 2z &= 4 \end{aligned}$$

Problem 4.

Use Gaussian elimination to solve the following linear systems:

$$\text{a) } \begin{aligned} x + y + z &= 11 \\ x + 2y + 4z &= 22 \\ x - y + z &= 1 \end{aligned}$$

$$\text{b) } \begin{aligned} x + y + z &= 6 \\ x + 2y + 4z &= 16 \\ x + 3y + 9z &= 20 \end{aligned}$$

Problem 5.

Use Gaussian elimination to solve the following linear systems. How many solutions are there?

$$\text{a) } \begin{aligned} x + 3y &= 1 \\ x - y &= 9 \\ 2x + 2y &= 3 \end{aligned}$$

$$\text{b) } \begin{aligned} x + 3y &= 7 \\ x - y &= 3 \\ 2x + 2y &= 10 \end{aligned}$$

$$\text{c) } \begin{aligned} x + y + z &= 11 \\ x - y + z &= 9 \\ 2x + 3y + 5z &= 44 \\ 3x - y + 2z &= 45 \end{aligned}$$

Problem 6.

Use Gaussian elimination to solve the following linear systems. How many solutions are there?

$$\text{a) } \begin{aligned} x + 2y + 3z &= 4 \\ -x - y + z &= 1 \\ 3x + 4y + z &= 2 \end{aligned}$$

$$\text{b) } \begin{aligned} 3x + 4y + 3z &= 2 \\ 2x - y + z &= 1 \\ 7x + 2y + 5z &= 3 \end{aligned}$$

